Installation Instructions

452

SIZE 90
Series C

GAS-FIRED AIR CONDITIONER

bryant

39452D25
1/2/70

Installation of the Model 90-452 Gas Air Conditioning Absorption Unit consists of the following steps:

I. Locate and Mount Absorption Unit
II. Connect Chilled Water Lines
III. Electrical Connections
IV. Gas Connections
V. Charge System with Water
VI. Check-Out and Operation
VII. Adjust Gas Input
VIII. Balance System

Each of the above steps is discussed in detail in this instruction. Read the entire instruction before starting installation.

Multiple Installations: When a multiple installation of this unit is planned, additional wiring and piping information is required. This is available through the local Bryant distributor. It is not recommended the Model 452 be inter-connected in multiples with other model chillers. This is undesirable because of difference in electrical characteristics, chiller water levels, pump head curve, etc.

I. LOCATE AND MOUNT ABSORPTION UNIT

The absorption unit is approved for outdoor installation only and may be located at ground level or on the roof. Consult local or other applicable codes for information concerning proximity to property lines, height above roof, obstructions, etc.

A. Mounting Base

1. USE NON-COMBUSTIBLE MATERIALS.

2. Suggested types of mounting base for ground installation:

a. Precast concrete lintels.
Use three lintels the depth of unit, one each under right and left end of unit and one at center of unit.

b. Concrete blocks.
Use one block at each corner of unit plus blocks under the two long sides midway between the corner blocks.

c. Concrete slab.
Minimum thickness 4 inches.

3. For installation on a roof or other combustible material leave sufficient clearance between unit base and roof for proper air circulation. Use precast concrete lintels or concrete blocks as described in paragraph 2 above or steel beams. Check local codes. Refer to NBFU code for Installation of Heat Producing Appliances.

B. Clearances

1. Absorption unit should have a minimum clearance of 2 feet on all sides from any adjacent obstruction.

2. Avoid locating the unit where hot condenser discharge air can impinge on nearby obstructions and mix with the inlet air supply. The condenser air discharges upward. The unit should be located outside of the plumb line from any over-hang.

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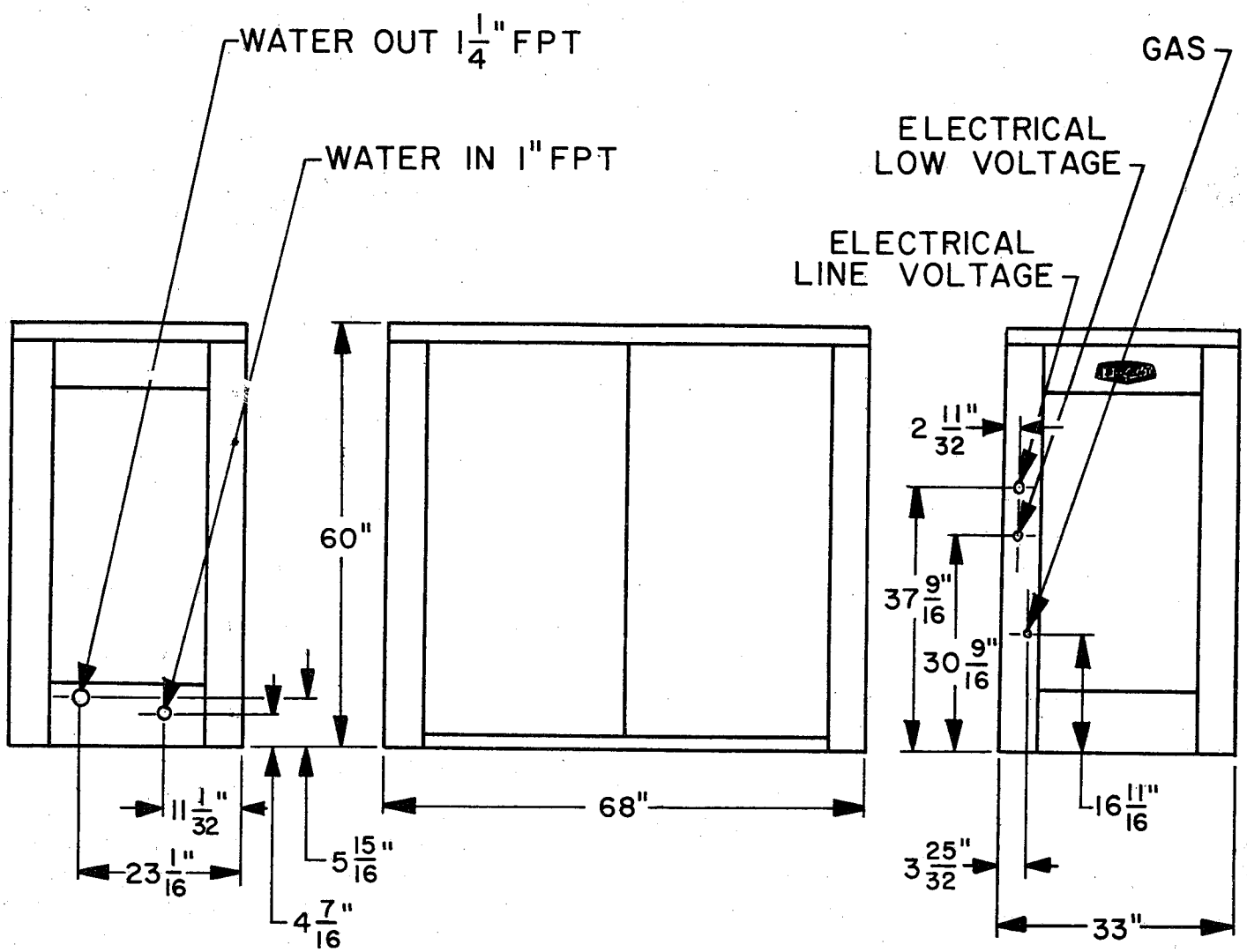


Figure 1

RATINGS AND CAPACITIES

MODEL		90-452
Cooling Capacity	BTUH	90,000
Heat Input	BTUH	225,000
Gas Connection Size	Inches	3/4
Condenser Air Delivery	CFM	10,000
Water Flow (Nominal)	GPM	18.5
Max. Friction Loss Handled by Chiller Pump	Ft	37
Fan Motor - 208/230V 1 Phase	HP	1/2 (2)
Chilled Water Pump Motor - 208/230V 1 Phase 60 cycle	HP	1/3
Solution Pump Motor - 208/230V 1 Phase 60 cycle	HP	1
Unit Full Load Current Draw	Amps	17.7
Approximate Shipping Weight	Lbs	1,300

Table I

Nominal Pipe Size Inches	Allowable Distance* Between Coil and Chiller		
	Polyethylene Pipe SIZE 90	Copper Pipe SIZE 90	Galvanized Pipe SIZE 90
1	30'	51'	54'
1¼	205'	165'	220'
1½	490'	388'	492'

* Note: Values shown in above table are for one direction only. The total length of pipe from chiller to coil and return would be double the above table values. The above table applies to single unit installations only.

II. CONNECT CHILLED WATER LINES

Chiller is designed for operation at atmospheric pressure only.

A. Materials

Refer to section on "Freezing Weather Protection at the end of this instruction.

1. Piping

a. Polyethylene Plastic Pipe - use medium density flexible pipe whose wall thickness approximates Schedule 40 pipe (Commercial Standard CS 255. Pipe must be virgin plastic. Do not use pipe manufactured from reclaimed plastic.

b. Copper - satisfactory substitute.

c. Galvanized - satisfactory substitute.

2. Fittings

a. Galvanized - use when possible.
b. Brass - satisfactory substitute.
c. Nylon - satisfactory substitute.

B. Pipe Length and Diameter

Table I shows maximum length of pipe of different diameters that can be used between the pump discharge and the coil inlet and still maintain minimum allowable (design) water flow rate.

1. Multiply table values by two to obtain the total length of pipe from chiller to coil and return.

2. Length is measured along the pipe path and therefore includes vertical distance between the water coil and the chiller.

3. Lengths shown in Table I are based on using a total of eight galvanized wellhead elbows in the entire water line (chiller to coil and return). Lengths are predicated on the use of a Bryant matching water coil. For greater distances use larger pipe or add a pump.

C. Insulation

1. Insulate supply and return lines separately.

2. Material should be of good quality and be covered with a good vapor barrier. Armaflex or equivalent is recommended.

Wall thickness: 1/2 inch.

D. Height of Coil above Absorption Unit

Practical coil elevation is limited only by the atmospheric pressure supported hydraulic head.

E. Water Coil Connections

1. If cooling coil is used in connection with heating unit, and the heating unit is not approved for installation downstream from cooling coil, install cooling coil in parallel with or downstream of heating unit. This will avoid condensation in heating unit. If coil and heating unit are installed in parallel the dampers

or other means used to control flow of air should be adequate to prevent chilled air from entering the heating unit, and if manually operated shall be equipped with means to prevent operating of either unit unless dampers are in full heat or cool positions.

2. If coil is located in warm air stream, do not connect polyethylene pipe directly to coil. Connect a minimum of 24 inches copper or galvanized pipe to both the coil inlet and outlet. Then connect the plastic pipe to these nipples.

3. On installations where the outside piping freezes and the coil is in a heated air stream, precautions must be taken to provide for water expansion. The connecting polyethylene plastic pipe acts as an expansion vessel if there is enough footage of this pipe in the heated space (space not subject to freezing). The following table shows the minimum lengths (total inlet and outlet) of plastic piping of various diameters that are required for both sizes of coils to provide adequate expansion volume.

Nominal Pipe Size Inches	Length of Plastic Pipe in feet
1	60
1-1/4	35
1-1/2	25

If the total plastic chilled water line footage in the heated space is not as long as the minimum values shown in the table, tee a vertical pipe of sufficient volume into either of the coil connections to provide for expansion, or the line should be drained.

III. ELECTRIC CONNECTIONS

1. Make all electric connections in accordance with the National Electrical Code and any local ordinances or codes that might apply.

2. Provide a separate power supply for the air conditioner.

3. Provide a fused disconnect switch within sight of and not more than 50 feet from the absorption unit. Use 35 amp standard fuse or 20 amp fusetron.

4. The unit is shipped from the factory completely wired. Connection of the 230V power supply to the power relay is made directly into the control box through a knockout in the corner panel on the right side of the unit. The low voltage (24V) wires from the thermostat control enter directly into the control box through a knockout in the corner panel on the right side. The low voltage wires are connected at terminal block.

5. Figure 5 is the wiring diagram for natural gas and LP gas units. See also schematic wiring diagram, Figure 6.

6. Disconnect chilled water pump electrical leads at the power relay in the control box before energizing the unit when ready to check field wiring. Do not operate the pump dry.

IV. GAS CONNECTIONS

Consult local gas company before making any gas connections. In case of conflict with this instruction, local requirements should be followed. This appliance is not suitable for use with conventional venting systems.

Before selecting the size and type of pipe that is to be used for installing the absorption unit, be sure to check with local gas company for the necessary information. The size of the gas pipe to be used between meter and unit will depend upon the length of run and the allowable pressure loss established by the utility.

The gas connection to the unit is made to the 3/4" shut off valve at the control manifold. The supply pipe enters the unit through an opening in the corner panel on the right side. Install a drip leg trap in the gas supply riser leading to the unit.

A wrench-type shut-off valve should be installed in the gas supply line within sight of, and convenient to the unit. It is recommended that ground joint unions be installed in the gas supply piping just outside the unit.

Joint compound (pipe dope) which is resistant to the action of liquefied petroleum gases should be applied sparingly and only to the male threads of the joints.

After gas pipe connections have been made, purge the lines and check for leakage. Use a soap and water solution or other such material. Turn off power supply to unit when purging the lines to prevent glow coil in re-ignition pilot from being energized. Never use matches, candles, flame or other source of ignition to check leakage.

Pilot

The natural gas unit is equipped with a re-ignition type pilot. The pilot will light automatically when supplied with gas and is electrically energized.

Light the pilot for both the natural gas and LP gas units using the procedure outlined on the lighting instruction plate attached to the generator. However, when lighting the pilot for the first time, perform the following additional steps:

1. If the supply line was not purged prior to connecting the unit, it will be full of air. Since it would take a long time to vent this air through the small pilot port, it is recommended that the pilot supply line be disconnected at the pilot shut-off valve and the supply line be allowed to purge until the odor of gas is detected. Never purge gas lines into the combustion chamber. Immediately upon detection of gas odor, reconnect the pilot supply tube. Allow 5 minutes to elapse and light the pilot in accordance with the instructions on the lighting plate.

2. The pilot flame should be soft blue in color.

a. For natural gas, this flame should be of sufficient length to provide good impingement on the unimetal of the Bryant pilot. Flame should extend upward between the carry-over ports of the two adjacent burners.

b. For LP gas, the flame should surround the tip of the thermocouple element of the pilot and extend downward to include 3/8 inch to 1/2 inch of the thermocouple. The flame must never come in contact with any other part of the thermocouple or its lead wire. The flame lies under the carry-over ports of the burners and merges with the carry-over flames.

3. If the pilot flame does not have the appearance described above, it may be adjusted by means of the manual pilot shut-off valve.

a. The valve is equipped with an adjustable screw. Turn the handle to the full open position, and remove the screw cap to expose the adjustable screw. Turn adjusting screw until flame has the desired appearance.

b. Replace screw cap.

V. CHARGING THE SYSTEM WITH WATER

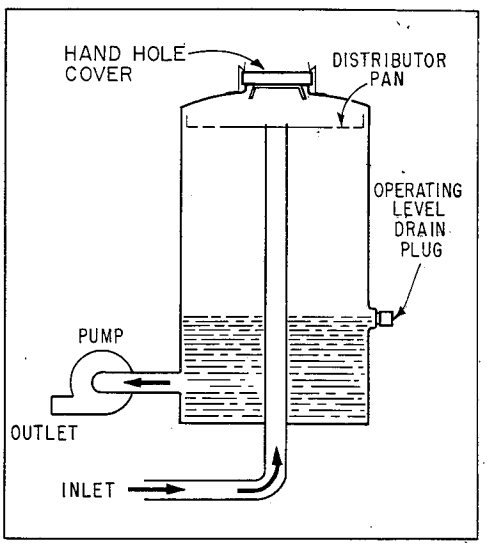


Figure 2

Caution: Do not run the pump dry. Freezing conditions will not damage the pump; however, do not attempt to operate the pump when chiller or chilled water lines are frozen.

1. Turn off main manual gas shut-off valve.

2. Remove hand hole cover located on top of chiller tank.

3. Disconnect water line at chiller inlet. (When installing the chilled water lines, it is advisable to leave this connection open until lines have been flushed.

4. Fill tank with tap water until distributor pan at top is covered with water. A garden hose is useful for this filling operation.

5. Start pump. Continue to supply water to the tank and operate pump until all foreign matter has been flushed from the lines. Then remove hose.

Note: If water does not circulate when the pump is started, air may be trapped in the pump. Bleed the air from pump through the 1/8 inch slotted head bleed valve located on top of the pump discharge. Open valve with screw driver. Close valve when the trapped air is removed and water appears.

6. Remove operating level drain plug and continue to operate pump until water stops flowing from drain opening.

7. Turn off pump. Make pipe connection to chiller inlet.

8. Replace operating level drain plug. Add several gallons of water to tank to raise water level above drain opening.

9. Start pump. Adjust water level with pump running. This is accomplished by removing drain plug. When water ceases to drain, the level is properly adjusted.

10. Add contents of chilled water additive packages to chiller tank through filler opening at top of tank. The packages supplied are sufficient for chilled water systems containing up to 15 gallons of water. For systems larger than 15 gallon capacity, add one package for each additional 15 gallon capacity or fraction thereof. To estimate chilled water capacity of system refer to Table II.

11. Replace hand hole cover.

12. The system is now ready to operate.

Table II

Water Capacity in Gallons

90-452 Chiller	9.7
Bryant 1-1/2 ton coil	0.6
Bryant 3 ton coil	1.0
Bryant 4-1/2 ton coil	1.5
Bryant 7-1/2 ton coil	2.5
1 ft. of 1 inch pipe	0.05
1 ft. of 1-1/4 inch pipe	0.08
1 ft. of 1-1/2 inch pipe	0.11

VI. CHECK OUT AND OPERATION

1. Be sure manual gas valve is off. Light pilot as described on Instruction Plate.

2. Turn on manual gas valve with the thermostat sub-base switch levers on "cool" and "auto". Set thermostat below room temperature. To check correct operation of electrical circuit, observe operation of gas valve, condenser fan motors, solution pump and indoor fan. Set thermostat above room temperature and observe that unit shuts off properly.

3. Check indoor fan operation by setting thermostat sub-base fan switch lever to "on". The indoor fan should operate continually with the thermostat set above or below room temperature.

4. To place the system in operation, open the main manual gas valves, replace all panels, and set the thermostat at the desired temperature.

High Temperature Cut-Off (1X or Earlier Code Date)

The high temperature circuit includes a high temperature control located on the front of the generator plus a lockout switch located in the control box. If the generator becomes overheated, the contacts in the high temperature control open, causing the lockout switch to go into the lockout position, shutting down the entire unit. To reset the lockout switch, push the red button extending through the rear panel of the control box. See Figure 3. Be sure to locate and correct cause of high temperature cutout.

High Temperature Cut-Off
(2X or Later Code Date)

If the generator becomes overheated, the contacts in the high temperature control open, causing the lockout switch to go into lockout position, locking out the gas valve. The solution pump, water pump, and condenser fan motors will continue to run until turned "off" at the main disconnect or the thermostat is satisfied manually. See note below.

The lockout switch is reset by pushing the red reset button.

NOTE: This unit can be identified by the EM-2419 number stamped on the unit rating plate (above serial number) or the wiring label on control panel.

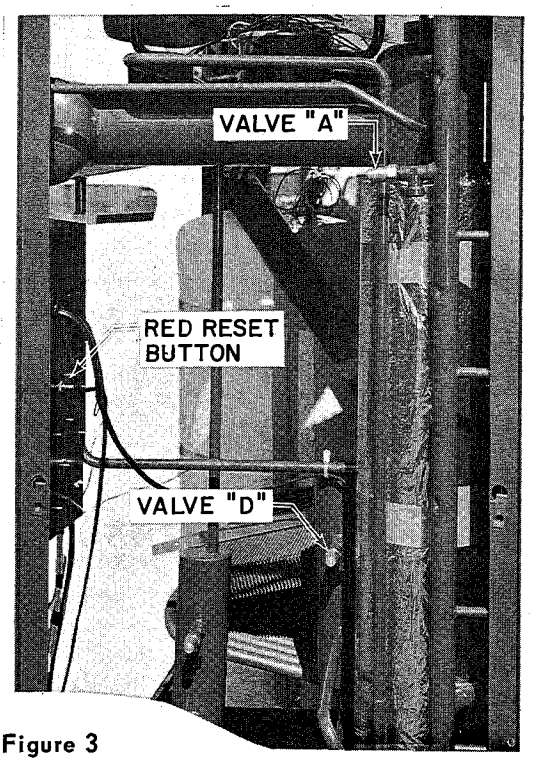


Figure 3

VII. ADJUST GAS INPUT

The gas input must be checked and adjusted if necessary to agree with that shown on the rating plate of the unit (225,000 Btuh). The burners are equipped with fixed orifices drilled as follows: Natural gas #39 drill; Propane gas #53 drill.

The natural gas units are equipped with adjustable gas pressure regulators set at factory for 3.0 inches w.c. manifold pressure. The LP gas units are not equipped with a pressure regulator.

Check natural gas units by one of the following methods.

1. Measure gas at meter. Be sure all other gas appliances are turned off. Increase or decrease input to burners by adjustment of the gas pressure regulator.

2. Set manifold pressure according to Table III for the Btu value and specific gravity of the gas to be supplied to the unit. Connect manometer to 1/8 inch pressure tap on manifold and with unit in operation set correct pressure by adjustment of the gas pressure regulator.

Example: Natural Gas
1025 BTU
0.63 Specific Gravity

1. From Table III manifold pressure is 3.2 inches w.c.

2. With manometer connected to manifold, set pressure at 3.2 inches by adjusting gas pressure regulator.

Table III - Manifold Pressure
(Inches w.c.)

BTU Value	Specific Gravity				
	0.59	0.61	0.63	0.65	0.67
900	3.9"	4.0"	4.1"	4.2"	4.3"
950	3.5"	3.6"	3.7"	3.8"	3.9"
1000	3.1"	3.2"	3.3"	3.4"	3.5"
1025	3.0"	3.1"	3.2"	3.3"	3.4"
1050	2.8"	2.9"	3.0"	3.1"	3.2"
1100	2.6"	2.7"	2.8"	2.9"	3.0"

For manifold pressures exceeding 3.0 inches ± .3 inches, consult local utility.

Check LP gas units as follows:

The burner orifices are sized for rated input with a manifold pressure of 11.0 inches w.c. Connect manometer to 1/8 inch pressure tap on unit manifold and adjust regulator at the supply tank to provide a manifold pressure of 11.0 inches w.c.

Caution: The unit may be run for short periods with the panel removed. Prolonged operation with panels removed should not be attempted.

VIII. BALANCE THE SYSTEM

After the unit is operating and the input has been measured and adjusted to agree with the rating plate requirements, balance the system.

Any approved method of checking the air flow over the water coil may be utilized. Reference is made to the Bryant Service Manual on Gas Air Conditioning for a review of standard methods. Do not purge non-condensibles or check solution level.

Freezing Weather Protection

Gas Air Conditioner

The Gas Air Conditioner has built-in freeze protection sufficient to protect the chiller and pump plus a small amount of external hard (non-plastic) pipe as shown in Figure 4.

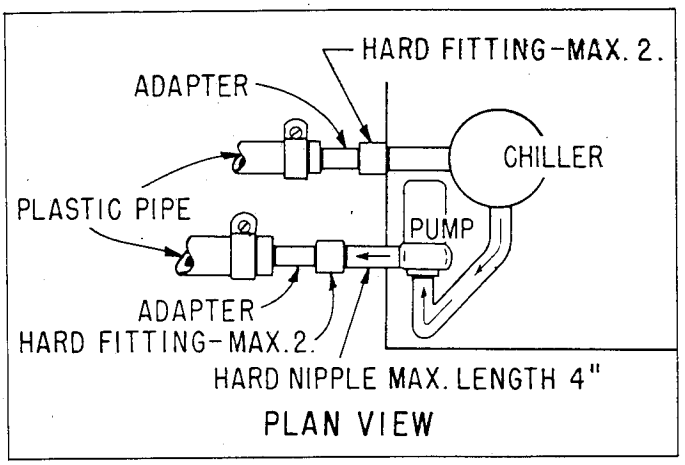


Figure 4

Chilled Water Pipes

If hard pipe (non-plastic) is used for the chilled water lines, it will be necessary to drain the lines or add anti-freeze. The recommended anti-freeze is methanol (uninhibited methyl alcohol). The chilled water additive must be used in the same proportion as indicated in Section V when anti-freeze treatment is required.

Chilled Water Coil

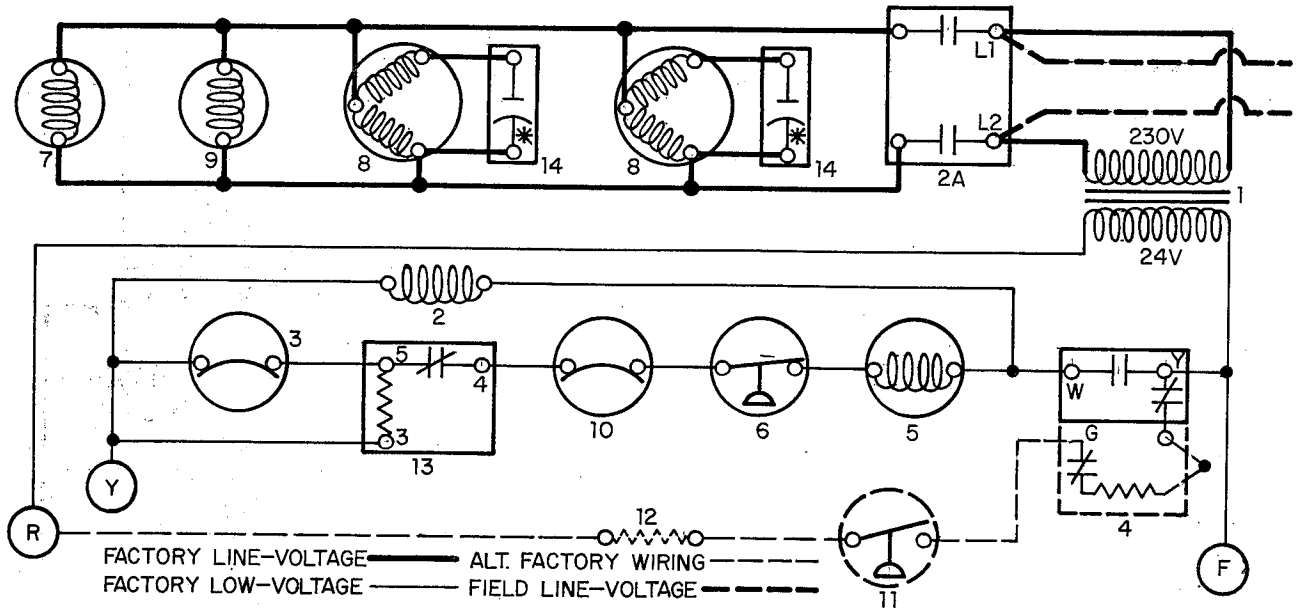
If water coil is subject to freezing temperatures, it will be necessary to protect the coil by the addition of anti-freeze. Chilled water coils cannot be completely drained. The chilled water additive must be used in the same proportion as indicated in Section V when anti-freeze treatment is required.

Operation at Freezing Temperatures

If the air conditioning system is to operate under freezing conditions, it will be necessary to add methanol in the amount required to protect to the lowest outdoor temperature. Consult your Bryant distributor for recommended procedure.

Anti-Freeze, Type and Amount

Consult your Bryant distributor for the required type and amount of anti-freeze required for system or component protection.



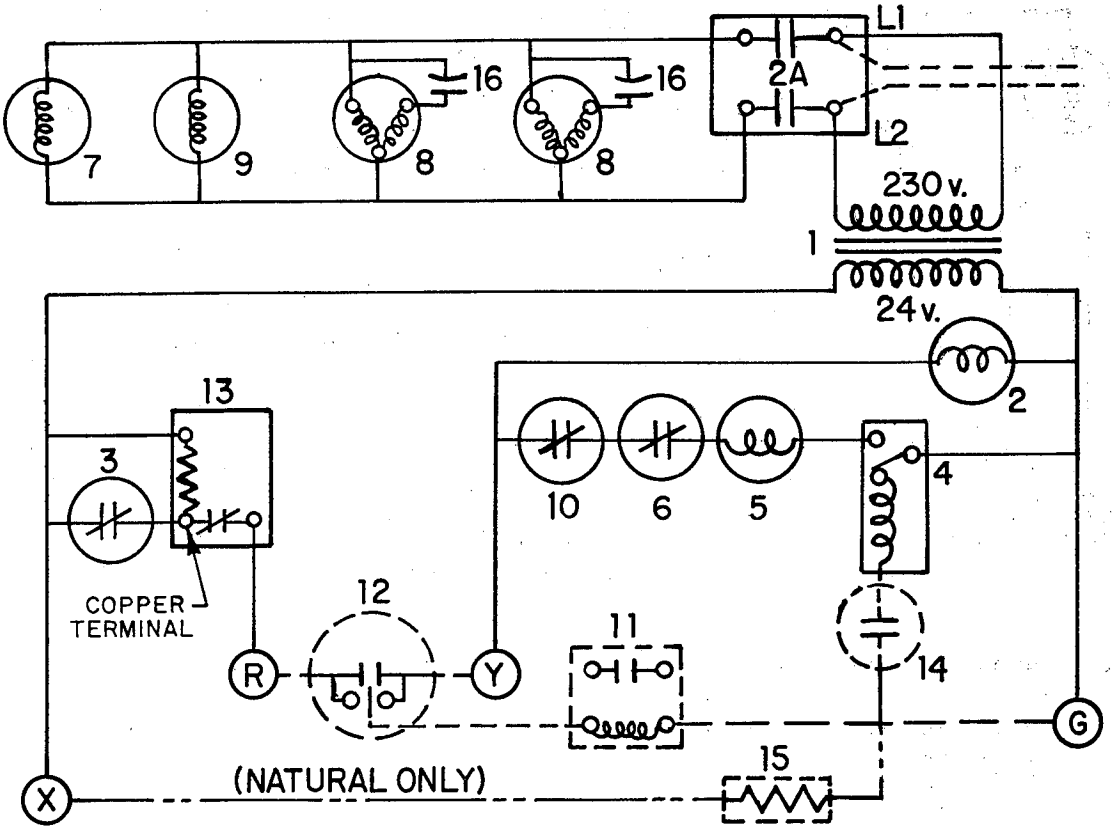
Note: Terminal F may be marked G on some units. Item 12 used on natural gas units only.

1. Transformer 230V to 24V 30VA Non-recycling Fuse
2. Power Relay Coil

2A. Power Relay Contacts

3. High Temp Cutout
4. Pilot
5. Gas Valve
6. High Pressure Switch, Automatic Reset
7. Chilled Water Pump Motor
8. Fan Motor
9. Solution Pump Motor
10. Part Load Control Switch, opens on low water temp
11. Pilot Gas Pressure Switch, prevents re-ignition coil operation while gas service is interrupted
12. Resistor, 2 ohms
13. High Temp Lockout, manual reset
14. Capacitor 5mf 370VAC 1 phase 60 cycle

Figure 5 – Wiring Diagram (2X or Later Code Date)

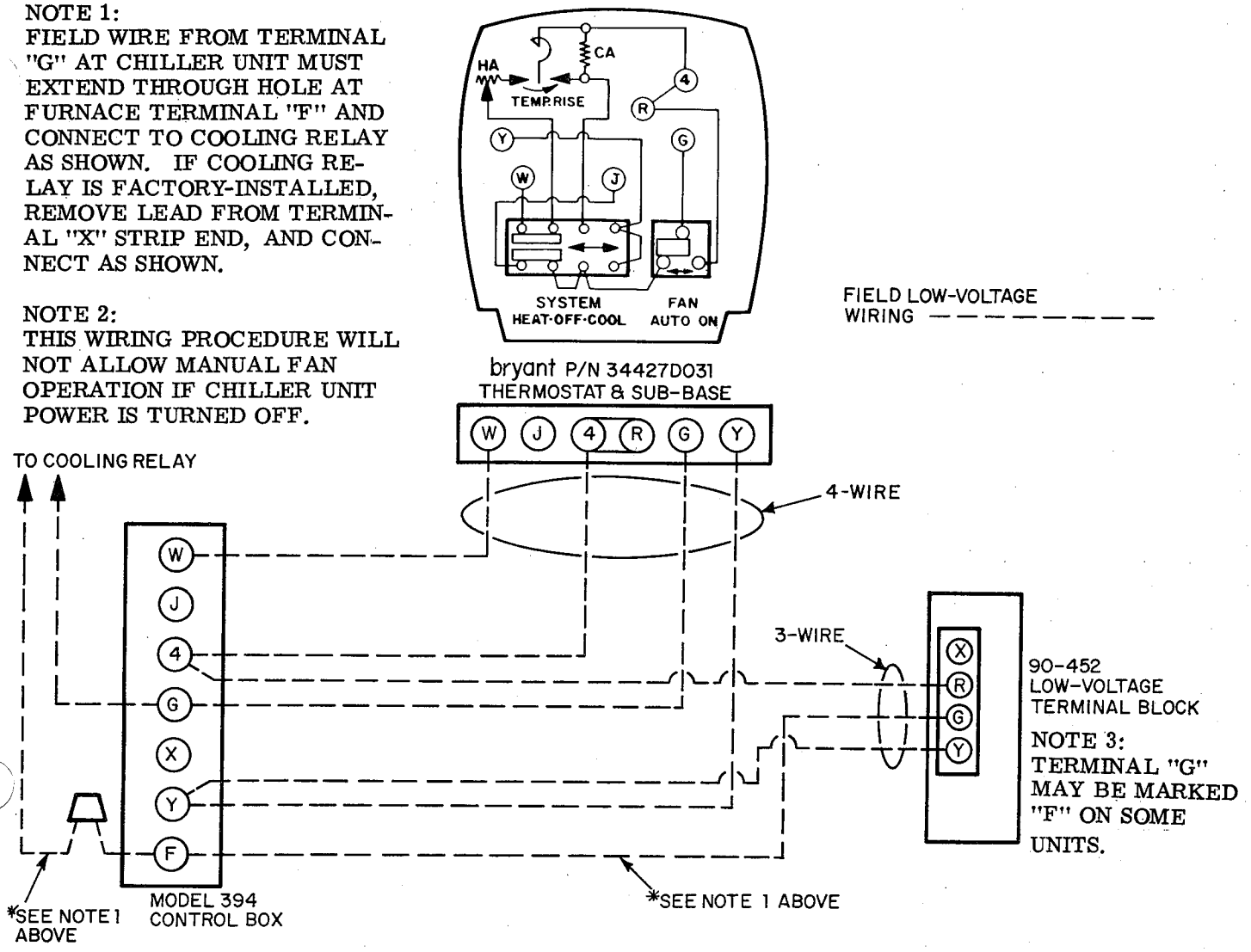


1. Transformer 230 V to 24V 30VA Non-recycling Fuse
2. Power Relay Coil
2A. Power Relay Contacts
3. High Temp Cutout (Automatic Reset)
4. Pilot
5. Gas Valve Bryant A 639 B
6. High Pressure Switch (Automatic Reset)
7. Chilled Water Pump Motor
8. Fan Motor
9. Solution Pump Motor
10. Part Load Control Switch, opens on low water temp
11. Remote Fan Relay, controlled by thermostat field installed
12. Thermostat and Sub-Base (heating and cooling field installed)
13. High Temperature Lock-Out (manual reset)
14. Pilot Gas Pressure Switch, prevents re-ignition coil operation while gas service is interrupted. Gas pressure closes switch.
15. Resistor 2 ohms
16. Capacitor 5mf 370 VAC 60 cycle 1 phase

Figure 6 – Wiring Diagram (1X or Earlier Code Date)

NOTE 1:
FIELD WIRE FROM TERMINAL "G" AT CHILLER UNIT MUST EXTEND THROUGH HOLE AT FURNACE TERMINAL "F" AND CONNECT TO COOLING RELAY AS SHOWN. IF COOLING RELAY IS FACTORY-INSTALLED, REMOVE LEAD FROM TERMINAL "X" STRIP END, AND CONNECT AS SHOWN.

NOTE 2:
THIS WIRING PROCEDURE WILL NOT ALLOW MANUAL FAN OPERATION IF CHILLER UNIT POWER IS TURNED OFF.



Wiring Diagram - Model 90-452 Gas Chiller with 190 or 220-394 Series E Furnace